

Application No. 09/990,182
Amendment dated October 15, 2004
Reply to Office Action of June 15, 2004

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

1.(Currently Amended) A rolling apparatus for rolling a workpiece rotatable about a rotational axis, the rolling apparatus comprising:

a rolling arm;

an arm support for supporting the rolling arm to allow the arm to follow the workpiece as it rotates for being rolled;

a first rolling head mounted on the rolling arm and including at least one roller to engage the workpiece and apply pressure thereto during a rolling operation;

a second rolling head mounted on the rolling arm spaced from the first rolling head and including at least one roller to engage the workpiece and to apply pressure thereto during a rolling operation;

a drive associated with the rolling arm for shifting one of the first and second rolling heads relative to the other rolling head between an open position to provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation; ~~and~~

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position; and

a backing portion of the arm that is disposed behind one of the drive for the one rolling head and the other roller head with the backing portion being integral with the arm to provide robust mounting for the one of the drive and the other rolling head for resisting reactive forces generated by the pressure applying tool head rollers in the closed position during the rolling operation of the workpiece bearing.

2. (Previously Presented) The rolling apparatus of Claim 1 wherein the first rolling head is fixed to the rolling arm and the one rolling head comprises the second rolling head that is movable rectilinearly along the rolling arm between the open position and the closed position.

3. (Previously Presented) The rolling apparatus of Claim 2 wherein the guide surfaces comprise slide surfaces on the second rolling head and the rolling arm that are engaged to guide the second rolling head for rectilinear sliding movement along the rolling arm.

4. (Original) The rolling apparatus of Claim 2 wherein the drive associated with the rolling arm comprises a fluid cylinder mounted on the rolling arm and connected to the second rolling head to shift the second rolling head rectilinearly along the rolling arm.

5. (Original) The rolling apparatus of Claim 1 wherein the drive associated with the rolling arm comprises a motor drive mounted on the rolling arm and connected to at least the second rolling head to shift it between the open and closed positions.

6. (Previously Presented) The rolling apparatus of Claim 1 wherein:
the first rolling head is fixed on the rolling arm;
the rolling arm and the second rolling head include the guide surfaces that
guide the second rolling head for movement toward and from the first rolling head;
and
the drive is mounted on the rolling arm for shifting the second rolling head
toward or away from the first rolling head.

7. (Original) The rolling apparatus of Claim 6 wherein the drive is a
hydraulic cylinder device having one portion fixed to the rolling arm and a second
movable portion fixed to the second rolling head to move the second rolling head.

8. (Currently Amended) A rolling apparatus for rolling a workpiece
rotatable about a rotational axis, the rolling apparatus comprising:
a rolling arm;
an arm support for supporting the rolling arm to allow the arm to follow the
workpiece as it rotates for being rolled;
a first rolling head mounted on the rolling arm and including at least one
roller to engage the workpiece and apply pressure thereto during a rolling
operation;
a second rolling head mounted on the rolling arm spaced from the first
rolling head and including at least one roller to engage the workpiece and to apply
pressure thereto during a rolling operation;
a drive associated with the rolling arm for shifting one of the first and
second rolling heads relative to the other rolling head between an open position to

provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation;

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position. ~~The rolling apparatus of Claim 1~~ wherein the arm support comprises a lever having spaced ends with one end pivotally connected to the rolling arm for pivoting of the rolling arm in one direction, and

an axial shift assembly to which the other end of the arm is pivotally connected for pivoting of the lever arm in another direction.

9. (Currently Amended) A rolling apparatus for rolling a workpiece rotatable about a rotational axis, the rolling apparatus comprising:

a rolling arm;

an arm support for supporting the rolling arm to allow the arm to follow the workpiece as it rotates for being rolled;

a first rolling head mounted on the rolling arm and including at least one roller to engage the workpiece and apply pressure thereto during a rolling operation;

a second rolling head mounted on the rolling arm spaced from the first rolling head and including at least one roller to engage the workpiece and to apply pressure thereto during a rolling operation;

a drive associated with the rolling arm for shifting one of the first and second rolling heads relative to the other rolling head between an open position to

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provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation;

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position. ~~The rolling apparatus of Claim 1~~ wherein the first and second rolling heads are at one end of the rolling arm; and

a counterweight [is] mounted on an opposite end of the rolling arm to counterbalance the arm.

10. (Original) The rolling apparatus of Claim 9 wherein the arm support comprises a pivoted lever which is pivotally connected to the rolling arm between the rolling heads and the counterweight.

11. (Currently Amended) The rolling apparatus of Claim 1 wherein the rolling arm is elongated horizontally; and

[a] the backing portion on the rolling arm is positioned behind the ~~first~~ other rolling head to resist the forces applied during the rolling operation.

12. (Currently Amended) The rolling apparatus of Claim [11] 1 wherein:
the drive comprises a hydraulic cylinder having a substantially fixed body portion and a moveable actuator portion for ~~thereof~~ shifting the second rolling head to the closed position; and

[a] the backing portion of the arm is positioned behind the hydraulic cylinder body portion to resist the forces applied during the rolling operation.

Claims 13-50 (Canceled)

51. (Previously Presented) The rolling apparatus of Claim 1 wherein the guide surfaces comprise bearing surfaces on the arm and the one rolling head that substantially stay engaged with each other as the one rolling head is shifted from the open position to the closed position.

52. (Previously Presented) The rolling apparatus of Claim 51 wherein the roller of the one rolling head stays approximately the same distance from the arm bearing surface as the one rolling head is shifted from the open position to the closed position.

53. (Previously Presented) The rolling apparatus of Claim 1 wherein the drive comprises a hydraulic cylinder having an actuator rod with the rod being fixed to the one rolling head and extending and retracting as the one rolling head is shifted between open and closed positions.

54. (Currently Amended) A rolling apparatus for rolling a workpiece rotatable about a rotational axis, the rolling apparatus comprising:
a rolling arm;
an arm support for supporting the rolling arm to allow the arm to follow the workpiece as it rotates for being rolled;
a first rolling head mounted on the rolling arm and including at least one roller to engage the workpiece and apply pressure thereto during a rolling operation;

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a second rolling head mounted on the rolling arm spaced from the first rolling head and including at least one roller to engage the workpiece and to apply pressure thereto during a rolling operation;

a drive associated with the rolling arm for shifting one of the first and second rolling heads relative to the other rolling head between an open position to provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation; and

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position.

wherein the drive comprises a hydraulic cylinder having an actuator rod with the rod being fixed to the one rolling head and extending and retracting as the one rolling head is shifted between open and closed positions and ~~The rolling apparatus of Claim 53 wherein~~ the cylinder has a thin and relatively tall construction to include multiple bores and drive pistons therein.

55. (Currently Amended) A rolling apparatus for rolling a workpiece rotatable about a rotational axis, the rolling apparatus comprising:

a rolling arm;

an arm support for supporting the rolling arm to allow the arm to follow the workpiece as it rotates for being rolled;

a first rolling head mounted on the rolling arm and including at least one roller to engage the workpiece and apply pressure thereto during a rolling operation;

a second rolling head mounted on the rolling arm spaced from the first rolling head and including at least one roller to engage the workpiece and to apply pressure thereto during a rolling operation;

a drive associated with the rolling arm for shifting one of the first and second rolling heads relative to the other rolling head between an open position to provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation; and

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position. ~~The rolling apparatus of Claim 1~~ wherein the rolling heads in the open position define a generally upwardly opening jaw to allow the arm to be lowered for workpiece loading and raised to position the rolling heads on either lateral side of the workpiece bearing for undertaking the rolling operation.

56. (Previously Presented) The rolling apparatus of Claim 55 wherein the arm support includes a pivotal support member that is pivotally attached to the arm to support the arm to extend generally in a horizontal direction with the support member extending generally in a vertical direction.

57. (Previously Presented) The rolling apparatus of Claim 56 wherein the pivotal support member and the rolling arm include a pivot connection therebetween with the first and second rolling heads on one side of the pivot connection; and

a counterweight attached to the arm at the other side of the pivot connection to keep the rolling arm generally extending in the horizontal direction.

58. (Currently Amended) A rolling apparatus for rolling a workpiece rotatable about a rotational axis, the rolling apparatus comprising:

a rolling arm;

an arm support for supporting the rolling arm to allow the arm to follow the workpiece as it rotates for being rolled;

a first rolling head mounted on the rolling arm and including at least one roller to engage the workpiece and apply pressure thereto during a rolling operation;

a second rolling head mounted on the rolling arm spaced from the first rolling head and including at least one roller to engage the workpiece and to apply pressure thereto during a rolling operation;

a drive associated with the rolling arm for shifting one of the first and second rolling heads relative to the other rolling head between an open position to provide clearance between the heads for a workpiece bearing to be rolled and a closed position for undertaking the rolling operation;

guide surfaces of the arm and the one rolling head that guide the shifting of the one rolling head by the drive from the open position to the closed position with the guide surface of the one rolling head engaged with the guide surface of the arm when the one rolling head is shifted to the closed position. ~~The rolling apparatus of Claim 1~~ wherein the arm support comprises a pivotal support member; and

a frame support that extends axially to allow the pivotal support member and the rolling arm supported thereby to be shifted axially substantially parallel to the workpiece rotational axis.

59. (Previously Presented) The rolling apparatus of Claim 58 wherein the pivotal support member includes spaced ends with one end being pivotally connected to the rolling arm; and

a suspension member supported for axial shifting along the frame support and to which the other end of the pivotal support member is pivotally connected.

60. (New) The rolling apparatus of claim 1 wherein the backing portion comprises a pair of backing portions with one backing portion disposed behind the drive and the other backing portion disposed behind the other roller head.